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(54) INK JET RECORDING PAPER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink jet recording paper which is extremely excellent in gloss property, and excellent in ink jet recording properties such as a printing density and a recorded image quality.

SOLUTION: In this ink jet recording paper for which a cast coating layer containing a pigment and an adhesive is provided on a base material, the pigment in the cast coating layer contains a silica particle wherein an average particle size of the primary particle is 3-40 nm, and an average particle size of the secondary particle is 10-400 nm, and a colloidal silica of which the average particle size is not more than 200 nm.

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CLAIMS

[Claim(s)]

[Claim 1] The ink jet record form characterized by the silica very fine particle and (2) mean particle diameter whose mean particle diameter of a secondary particle the mean particle diameter of (1) primary particle is 10nm or more 400nm or less in 3nm or more 40nm or less for said pigment in a cast coating layer containing colloidal silica 200nm or less in the ink jet record form which prepared the cast coating layer which contains a pigment and adhesives in a base material.

[Claim 2] The ink jet record form according to claim 1 characterized by preparing at least one layer of under coats containing a pigment and adhesives between a base material and a cast coating layer.

[Claim 3] The ink jet record form according to claim 1 or 2 50% of the weight or more of the pigment in a cast coating layer is said silica very fine particle, and whose 50 or less % of the weight 5 % of the weight or more is said colloidal silica.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the ink jet record form which was excellent in gloss and was excellent in ink jet record fitness about an ink jet record form.

[0002]

[Description of the Prior Art] The record by the ink jet printer has little noise, possible [high-speed record], since multiple-color-izing is easy, is various and is used. The paper of fine quality devised as an ink jet record form so that it might be rich in ink absorptivity, the coated paper which carried out coating of the porous pigment to the front face are applied. By the way, the ink jet record form in which all of these forms have the outstanding appearance with high surface gloss since the ink jet record form of the so-called mat tone with low surface gloss is a subject is demanded. The so-called cast coated paper obtained by copying the mirror plane is known by carrying out coating of the tabular pigment to a front face, and generally, sticking by pressure and drying the coated paper which has the high gloss which performed calender processing if needed further, or a humid coating layer as a high form of surface gloss, to the heating drum side which has a mirror plane. Since it has the surface smooth nature which was superior to high surface gloss as compared with the usual coated paper by which super calender finishing was carried out and the outstanding printing effectiveness is acquired, this cast coated paper is chiefly used for the application of high-class printed matter etc., but various difficulties are held when it uses for an ink jet record form.

[0003] That is, generally conventional cast coated paper is indicated by US No. 5275846. High gloss has been acquired when membrane formation nature matter, such as adhesives in the pigment constituent which constitutes the coating layer, copies the mirror plane

drum front face of a cast coating machine. On the other hand, the porosity of a coating layer is lost by existence of this membrane formation nature matter, and it has the problem of reducing extremely absorption of the ink at the time of ink jet record. And although it is important to make it porous so that a cast coating layer can absorb ink easily and it is necessary to reduce membrane formation nature for that purpose in order to improve this ink absorptivity, blank paper gloss falls as a result by reducing the amount of the membrane formation nature matter. Like the above, it was very difficult to satisfy both the surface gloss of cast coated paper, and ink jet record fitness to coincidence. In in the paper [Hara] the recording layer which uses a pigment and adhesives as a principal component was prepared as an approach of solving the above-mentioned problem Carry out coating of the coating liquid which uses as a principal component the copolymer constituent which has the glass transition point 40 degrees C or more to which it comes to carry out the polymerization of the monomer which has an ethylene nature unsaturated bond, and the coating layer for the casts is made to form. this invention person etc. proposed that the cast paper for ink jet record which combines the gloss which dried and was excellent in the mirror plane drum heated while this coating layer for the casts was in the damp or wet condition a pressure welding and by finishing, and ink absorptivity was obtained as a header and JP,7-89220,A. However, in order to have filled such a demand, even if it used the technique proposed previously, achievement was difficult, although gloss and record quality which strong gloss and high definition, and quality of high record concentration are further desired in recent years with expansion of applications, such as improvement in the speed of ink jet record, highly-minute-izing of a record image, and full-color-izing, for example, are equal to the printing paper for photographs of a silver salt method were searched for.

[0004]

[Problem(s) to be Solved by the Invention] This invention offers the ink jet record form which was extremely excellent in glossiness and was excellent in ink jet record fitness, such as printing concentration and record image quality.

[0005]

[Means for Solving the Problem] This invention contains the following mode.

[1] The ink jet record form characterized by the silica very fine particle and (2) mean particle diameter whose mean particle diameter of a secondary particle the mean particle diameter of (1) primary particle is 10nm or more 400nm or less in 3nm or more 40nm or less for said pigment in a cast coating layer containing colloidal silica 200nm or less in the ink jet record form which prepared the cast coating layer which contains a pigment and adhesives in a base material.

[2] The ink jet record form given in [1] characterized by preparing at least one layer of under coats containing a pigment and adhesives between a base material and a cast coating layer.

[3] [1] to which a cast coating layer is characterized by containing a cationic compound, or an ink jet record form given in [2].

[4] The ink jet record form given in [2] characterized by for an under coat not containing a cationic compound but a cast coating layer containing a cationic compound.

[5] The ink jet record form given in [3] and [4] with which colloidal silica is characterized by being cationic colloidal silica.

[6] a cast coating layer -- a base material -- or the ink jet record form given in [2] - [5]

characterized by the pressure welding and drying and coming to finish at the heated mirror plane drum after carrying out after [desiccation] re-humidity while coating of the coating liquid for cast coating layers is carried out and this cast coating layer is in a damp or wet condition after preparing an under coat or.

[7] The ink jet record form given in [2] - [6] with which the pigment of an under coat is characterized by the thing of amorphous silica, an alumina, and a zeolite for which a kind is contained at least.

[8] The ink jet record form given in [2] - [7] characterized by an under coat containing the complex of the polymer resin and colloidal silica to which it comes to carry out the polymerization of the monomer which has an ethylene nature unsaturated bond.

[9] In the manufacture approach of an ink jet record form of preparing the cast coating layer containing a pigment and adhesives on a base material Or it sets to the manufacture approach of an ink jet record form of preparing at least one layer of under coats which contain a pigment and adhesives in a base material, and preparing the cast coating layer containing a pigment and adhesives on this under coat further. On a base material, or after preparing this under coat, then carrying out coating of the coating liquid for cast coating layers and half-drying, They are a pressure welding and the thing dried and finished at the heated mirror plane drum. The mean particle diameter of (1) primary particle by 3nm or more 40nm or less [the pigment in this cast coating layer] The manufacture approach of the ink jet record form characterized by the mean particle diameter of a secondary particle containing the colloidal silica which 10nm or more silica very fine particle which is 400nm or less, and (2) mean particle diameter become from a primary particle 200nm or less.

[10] The half-dried coating liquid for cast coating layers is the manufacture approach given [moisture] in 20 - 400 weight ***** [9] to the solid content 100 weight section.

[11] [1] 50% of the weight or more of the pigment in a cast coating layer is said silica very fine particle, and whose 50 or less % of the weight 5 % of the weight or more is said colloidal silica, or an ink jet record form given in [2].

[0006]

[Embodiment of the Invention] Especially as a base material used by this invention, it is not limited and paper bases, such as acid paper used for common coated paper or alkaline paper, are used suitably. Moreover, the resin sheets which have infiltration, and a synthetic paper can also be used. A paper base is constituted considering a pigment as a principal component wood pulp and if needed. Various chemical pulp, mechanical pulp, playback pulp, etc. can be used for wood pulp, and these pulp can adjust a degree of beating with a beating machine, in order to adjust paper durability, paper-making fitness, etc. Although especially the degree of beating (freeness) of pulp does not limit, generally it is 250-550ml (CSF:JISP -8121) extent. A pigment gives opacity etc., or it blends it in order to adjust ink absorptivity, and it can use a calcium carbonate, a baking kaolin, a silica, titanium oxide, etc. In this case, about 1 - 20% of loadings are desirable. When many [too], there is a possibility that paper durability may decline. A sizing compound, a fixing agent, a paper reinforcing agent, a cation-ized agent, a yield improver, a color, a fluorescent brightener, etc. can be added as an assistant. Furthermore, it sets at the size press process of a paper machine, starch, polyvinyl alcohol, cation resin, etc. are applied and infiltrated, and whenever [surface reinforcement and size] etc. can be adjusted. Whenever [size] has about 1 - 200 desirable seconds. It may become operation top

problems -- if whenever [size] is low, a wrinkle will occur at the time of coating -- and if high, ink absorptivity may fall, or the curl after printing and a cock ring may become remarkable. Especially the basis weight of a base material is 20 - 400 g/m², although not limited. It is extent.

[0007] Although a direct cast coating layer may be prepared on a base material, it is desirable to prepare an under coat in order to raise the absorption capacity of ink, and rate of absorption. The under coat prepared on a base material is constituted considering a pigment and adhesives as a principal component. The pigment in a recording layer A kaolin, clay, baking clay, amorphous silica (it is also called an amorphism silica), Synthetic amorphous silica, a zinc oxide, an aluminum oxide, an aluminum hydroxide, A calcium carbonate, a satin white, aluminum silicate, an alumina, colloidal silica, A zeolite, permutite, sepiolite, a smectite, a synthetic smectite, A magnesium silicate, a magnesium carbonate, a magnesium oxide, diatomaceous earth, The various pigments of well-known official business can use together one sort or more than it in the common coated paper manufacture fields, such as a styrene system plastics pigment, a hydrotalcite, a urea-resin system plastics pigment, and a benzoguanamine system plastics pigment. It is desirable to use the high amorphism silica of ink absorptivity, an alumina, and a zeolite as a principal component also in these.

[0008] As under coat adhesives, protein, such as casein, soybean protein, and synthetic protein Various starch, such as starch and oxidization starch, polyvinyl alcohol, cationic polyvinyl alcohol, Cellulosics, such as polyvinyl alcohol, such as silyl denaturation polyvinyl alcohol, a carboxymethyl cellulose, and methyl cellulose, The conjugated diene system polymer latex of a styrene-butadiene copolymer and a methyl methacrylate-butadiene copolymer, conventionally well-known adhesives generally used as an object for coated paper, such as vinyl system polymer latexes, such as an acrylic polymer latex and an ethylene-vinylacetate copolymer, -- independence -- or it is used together and used. although the blending ratio of coal of a pigment and adhesives is based also on the class -- general -- the pigment 100 weight section -- receiving -- adhesives 1 - the 100 weight sections -- it is preferably adjusted in the range of 2 - 50 weight section. In addition, various assistants, such as a dispersant used in manufacture of common coated paper, a thickener, a defoaming agent, an antistatic agent, and antiseptics, are added suitably. Fluorescent dye and a coloring agent can also be added in an under coat.

[0009] Into an under coat, a cationic compound can also be blended in order to establish the color component in the ink for ink jet record. However, since printing (record) concentration becomes high [direction] that you made it fixed as much as possible to the cast coating layer prepared on an under coat as for an ink color, it is desirable, and, for that, it is more desirable [a color] than the inside of an under coat to blend many cationic compounds into a cast coating layer so that it may state later. Furthermore, preferably, a cationic compound is blended only with a cast coating layer, and it is good in an under coat for a cationic compound not to exist substantially. If it does not exist substantially, carrying out minute amount addition of the cationic surfactant etc. in assistant will be excepted. A cationic compound is blended only with a cast coating layer, and when a cationic compound does not exist substantially in an under coat, it is the easiest to discover the gloss at the time of preparing a cast coating layer.

[0010] If complex with the polymer resin which comes to carry out the polymerization of the monomer which has an ethylene nature unsaturated bond to colloidal silica is blended

into an under coat, the gloss at the time of preparing a cast coating layer will be demonstrated more. Although this reason is not necessarily clear, existence of said complex is presumed for controlling osmosis in the under coat of the coating constituent for cast coating layers, with the ink absorptivity of an under coat maintained.

Furthermore, although the reason is unknown, it has the inclination for the mold-release characteristic from the cast drum at the time of preparing a cast coating layer with a cast method to improve. As polymer resin to which it comes to carry out the polymerization of the monomer which has an ethylene nature unsaturated bond For example, methyl acrylate, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, laurylacrylate, 2-hydroxyethyl acrylate, The acrylic ester whose alkyl group carbon numbers, such as glycidyl acrylate, are 1-18 pieces, Methyl methacrylate, ethyl methacrylate, 2-hydroxyethyl methacrylate, The methacrylic ester whose alkyl group carbon numbers, such as 2-hydroxypropyl methacrylate and glycidyl methacrylate, are 1-18 pieces, Styrene, alpha methyl styrene, vinyltoluene, acrylonitrile, The polymer obtained by carrying out the polymerization of the ethylene nature monomers, such as a vinyl chloride, a vinylidene chloride, vinyl acetate, propionic-acid vinyl, acrylamide, N-methylol acrylamide, ethylene, and a butadiene, is mentioned. In addition, a polymer may be a copolymer which used together two or more kinds of ethylene nature monomers if needed, and these polymers or the permutation derivative of a copolymer is sufficient as it further. Incidentally, as a permutation derivative, the thing carboxyl-group-ized, for example or the thing which made it alkali reactivity is illustrated.

[0011] Or compound-ization with colloidal silica carries out the polymerization of the above-mentioned ethylene nature monomer to a silane coupling agent etc. under existence of colloidal silica and it uses it as complex by Si-O-R association (R: polymer component), the polymer resin and colloidal silica which denaturalized by the silanol group etc. if needed are made to react, and the approach of using as complex by Si-O-R association (R: polymer component) is mentioned. Although especially Tg (glass transition point) of the polymer component of the above-mentioned complex does not limit, 40 degrees C or more are desirable, and the range which is 50-100 degrees C is more desirable. When Tg is low, in case it is desiccation, probably because membrane formation progresses too much, the case where absorption of ink becomes slow and a blot occurs arises. Furthermore, although the reason is unknown, when Tg is 40 degrees C or more, there is an inclination for the mold-release characteristic from the cast drum at the time of preparing a cast coating layer with a cast method to improve more.

[0012] the constituent for under coats constituted with the above-mentioned ingredient -- general -- solid content concentration -- about 5 - 50 % of the weight -- adjusting -- a paper base top -- dry weight -- 2 - 100 g/m² -- desirable -- 5 - 50 g/m² extent -- further -- desirable -- 10 - 20 g/m² Coating is carried out so that it may become extent. When many [ink absorptivity may be inferior, or if there are few amounts of coating, when a gloss layer is prepared, gloss may not fully come out, and], printing concentration falls, or the reinforcement of a coating layer falls and powder omission and a blemish become easy to be attached. the constituent for under coats -- the coating equipment of various well-known official businesses, such as a blade coating machine, an air knife coater, a roll coater, a brush coating machine, a CHAMPU REXX coating machine, a bar coating machine, a lip coating machine, a gravure coating machine, and a curtain coating machine, -- coating -- it dries. Furthermore, data smoothing, such as a super calender and

brushing, can also be performed after desiccation of a recording layer if needed.

[0013] this invention -- a base material top -- or a cast coating layer is further prepared on the recording layer which consists of the above-mentioned pigment and adhesives. This cast coating layer uses a pigment and adhesives as a principal component. As a pigment, mean particle diameter of (1) primary particle is characterized by the silica very fine particle whose mean particle diameter of a secondary particle it is 3nm or more 40nm or less, and is 10nm or more 400nm or less, and (2) mean particle diameter containing colloidal silica 200nm or less. Although what was excellent in printing grace (record concentration, ink absorptivity, etc.), and was excellent also in gloss to some extent by using the silica very fine particle of (1) is obtained, what was extremely excellent in gloss is obtained by using (2) together, without reducing printing grace. First, the silica very fine particle of (1) is explained. Although especially the adjustment approach of a silica very fine particle used for this invention is not limited, it can obtain by giving the strong force for the synthetic amorphous silica (for example, secondary particle diameter being an about several microns thing) generally marketed, for example by the mechanical means, and making secondary particle diameter small. As this mechanical means, an ultrasonic homogenizer, a pressure type homogenizer, a high-speed tumbling mill, a roller mill, a container drive medium mill, a medium agitation mill, a jet mill, a Sand grinder, etc. are raised. Thus, generally the processed silica very fine particle is obtained as a water dispersing element (a slurry or colloidal particle) whose solid content concentration is about 5 - 20%. The mean particle diameter as used in the field of this invention is particle diameter observed with the electron microscope (SEM and TEM) (what took the 10,000 to 400,000 times as many electron micrograph as this, measured the diameter of Martin of the particle in 5cm around, and was averaged.). "Particle handbook" (Asakura Publishing) It is indicated in 52, P1991, etc. . The mean particle diameter of the silica very fine particle (a secondary particle is a subject substantially) used by this invention is 10nm or more 400nm or less, and is more preferably adjusted to 20nm or more 100nm or less 15nm or more 150nm or less. If the mean particle diameter of the secondary particle of a silica very fine particle exceeds 400nm, the transparency of a cast coating layer will fall, the color enhancement of the color to which it was fixed into the cast coating layer will fall, and the printing concentration considered as a request will not be obtained. Moreover, if a silica very fine particle with the very small mean particle diameter of a secondary particle is used, ink absorptivity cannot fall and the image grace considered as a request cannot be acquired.

[0014] Moreover, it is necessary to adjust the mean particle diameter of the primary particle of a silica very fine particle to 3nm or more 40nm or less, and it is 7nm or more 20nm or less more preferably 5nm or more 30nm or less. If the average of primary particle diameter is set to less than 3nm, the opening between primary particles cannot become remarkably small, the capacity which absorbs the solvent and ink in ink cannot decline, and the image grace considered as a request cannot be acquired. Moreover, if the average of primary particle diameter exceeds 40nm, the condensed secondary particle will become large, the transparency of a cast coating layer will fall, the color enhancement of the color to which it was fixed into the cast coating layer will fall, and the printing concentration considered as a request will not be obtained.

[0015] 50% or more of the ratio of the silica very fine particle in all the pigments in a cast coating layer is desirable in order to maintain the transparency of a recording layer, and

ink absorptivity. When the ratio of the silica very fine particle in [all] a pigment becomes less than 50%, there is a possibility that transparency may fall, and image grace, such as printing concentration, may fall. Next, the colloidal silica of (2) is explained. Colloidal silica points out the thing of a colloidal particle which made dispersion media, such as water, distribute the ultrafine particle (primary particle) of a silicic anhydride generally. It may be a dispersing element although colloidal silica is usually the independent dispersing element of a primary particle, and a primary particle connects with a line 2 - ten numbers. Although the particle diameter of the dispersoid of the colloidal solution is generally set to 1nm - 100nm, what exceeds 100nm here (the so-called silica sol) shall be included. In addition, although there are generally many true ball-like things, things, such as the shape of the shape of a chain and a rosary, are sufficient as colloidal silica, and it is not limited especially. Mean particle diameter needs to be 200nm or less, and is 50nm or less more preferably 100nm or less. If mean particle diameter exceeds 200nm, the transparency of a cast coating layer will fall, the color enhancement of the color to which it was fixed into the cast coating layer will fall, and the printing concentration considered as a request will not be obtained. Moreover, it is deficient in the effectiveness of the improvement in gloss, and it is generated also when falling conversely. It excels in a miscibility with a cationic compound and is desirable when blending a cationic compound with a cast coating layer so that the following may be carried out, and cationic colloidal silica is used as colloidal silica. In addition, for the usual amorphous silica which is not colloidal silica, a primary particle is 3. Much assembly flocs are formed in dimension and it has porous structure. 50% or less 5% or more is desirable still more desirable, and the ratio of the colloidal silica in all the pigments in a cast coating layer is 30% or less 10% or more. At less than 5%, it is deficient in the effectiveness of the improvement in gloss, exceeding 50%, if many, ink absorptivity will fall, ink overflows, it spreads or the case where it carries out arises. as adhesives -- water soluble resin (for example, polyvinyl alcohol and cation denaturation polyvinyl alcohol --) Polyvinyl alcohol, such as silyl denaturation polyvinyl alcohol, casein, Cellulosics, such as soybean protein, synthetic protein, starch, carboxyl methyl cellulose, and methyl cellulose, Conjugated diene system polymer latexes, such as a styrene-butadiene copolymer and a methyl methacrylate-butadiene copolymer, the various adhesives of well-known official business of water-dispersion resin, such as vinyl system copolymer latexes, such as a styrene-vinyl acetate copolymer, aquosity acrylic resin, aquosity polyurethane resin, and aquosity polyester resin etc. are independent in the coated paper field to general -- or it is used together and used. the loadings of adhesives -- the pigment 100 weight section -- receiving -- the 1 - 200 weight section -- it is more preferably adjusted in the range of the 10 - 100 weight section. If there are few amounts of adhesives here, that the reinforcement of a coating layer becomes weak and a front face tends to get damaged, it may become or powder omission may occur. Conversely, if there are many amounts of adhesives, ink absorptivity falls and desired ink jet record fitness may not no longer be acquired.

[0016] It is desirable to blend a cationic compound in order to fix the color component in ink to a cast coating layer. Although what is necessary is just to mix the approach of combination to said silica very fine particle, generally a silica very fine particle is anionic, and condensation may take place in the case of mixing. In this case, when the strong force is given by the mechanical means and amorphous silica (it has a several

microns diameter of an aggregated particle) generally marketed is made into a very fine particle, [whether after carrying out mixed distribution of the cationic compound together at the amorphous silica before processing, a mechanical means distributes and grinds and] Or after mixing a cationic compound to the secondary silica particle dispersing element made detailed and making it once thicken and condense, the approach of machine-distributing, grinding again and adjusting the desired diameter of floc etc. can be taken.

[0017] As a cationic compound, cationic resin and low-molecular cationic compounds (for example, cationic surfactant etc.) can be illustrated. In respect of the effectiveness of the improvement in printing concentration, cationic resin is desirable and can use it as water soluble resin or an emulsion. Furthermore, it can be used also as a cationic organic pigment which cationic resin was insolubilized with means, such as bridge formation, and was made into the particle-like gestalt. In case such a cationic organic pigment carries out the polymerization of the cationic resin, it copolymerizes a polyfunctional monomer, and uses it as bridge formation resin, or adds a cross linking agent if needed to the cationic resin which has reactant functional groups (a hydroxyl group, a carboxyl group, the amino group, aceto acetyl group, etc.), and can illustrate what was used as bridge formation resin with means, such as heat and a radiation. A cationic compound, especially cationic resin may play a role of adhesives.

[0018] Cationic resin can illustrate the following. Specifically Polyalkylene polyamine or the derivatives of those, such as 1 polyethylene polyamine and polypropylene polyamine, 2) Acrylic resin which has a secondary amine radical, a tertiary amine radical, and the 4th class ammonium, 3) A polyvinyl amine, polyvinyl amidines, cyanogen system cation resin represented by 4 dicyandiamide-formaldehyde polycondensation, 5) Polyamine system cation resin represented by the dicyandiamide-diethylenetriamine polycondensation object, 6) An epichlorohydrin-dimethylamine addition polymerization object, 7 dimethyl diaryl ammoniumchloride - S02 Copolymerization object, 8) Diaryl amine salt - S02 A copolymerization object, 9 dimethyl diaryl ammoniumchloride polymerization object, 10) Cationic compounds, such as a polymerization object of an allylamine salt, the 4th class salt polymerization object of 11 dialkyl aminoethyl (meta) acrylate, and a 12 acrylamide-diaryl amine salt copolymerization object.

[0019] A cationic compound also has the effectiveness of raising a printing image water resisting property further. although especially the cationic compound blended with a cast coating layer is not limited -- the pigment 100 weight section -- receiving -- the 1 - 100 weight section -- it can be more preferably used in the range of 5 - 50 weight section. If there are few loadings, the effectiveness of the improvement in printing concentration will be hard to be acquired, and if many, printing concentration will fall conversely, or there is also a possibility that NIJIMI of an image may occur. In this invention, by drying in tops, such as a cast drum (drums, such as a metal which carried out mirror plane finishing, plastics, and glass) which has smooth nature for a coating layer, a metal plate which carried out mirror plane finishing, a smooth sheet plastic, and a film, a glass plate, and copying a smooth side on a coating layer, a cast method is smooth and is the approach of obtaining a glossy coating layer front face. as a smooth field -- for example, surface roughness (JIS B0601) $R_a =$ -- 0.5 or less micrometers is less than [$R_a =$ 0.05micrometer] more preferably. The manufacturing method which used the heated mirror plane drum as an approach of preparing a cast coating layer is a desirable mode,

and although especially whenever [stoving temperature / of a mirror plane drum] is not limited, it is 40 degrees C - 150 degrees C, for example. Coating of the above-mentioned coating liquid for cast coating layers can be carried out on a base material or an under coat, to the mirror plane drum heated while this coating layer was in the damp or wet condition, it dries, and it dries and a pressure welding, the approach (the RIWETTO cast method) of finishing, etc. can be illustrated at a pressure welding, the approach (the wet cast method) of finishing, or the mirror plane drum that once carried out after [desiccation] re-humidity and by which afterbaking was carried out. Generally the direction of the wet cast method tends to become what is excellent in gloss and ink absorptivity, and the direction of the RIWETTO cast method tends to become the thing excellent in productivity. Moreover, after carrying out coating of the coating liquid for direct cast coating layers to the heated mirror plane drum, it can dry and a pressure welding and the approach (the pre cast method) of finishing can also be adopted as the under coat side of a base material in which the under coat was prepared.

[0020] Furthermore, while carrying out coating of the above-mentioned coating liquid for cast coating layers on a base material or an under coat, drying this cast coating layer to some extent and being in the condition of half-desiccation, especially since a pressure welding and the gloss layer which the uniform coating layer was easy to be formed and whose printing concentration was high when dried and finished, and was excellent in gloss tend to be obtained by the heated mirror plane drum, it is desirable. Moisture means the condition of containing mostly and half-desiccation is adjusted in 50 - 200% of range here preferably [considering as extent to coating layer oven dry weight 20 to 400% (that is, the moisture of the 20 - 400 weight section being included to the oven-dry-weight 100 weight section of a coating layer)], and more preferably, although most fluidities of a coating layer are lost. If there is little moisture, it will become inadequate imprinting [of the mirror plane at the time of carrying out a pressure welding to a mirror plane drum], and gloss will fully be hard to be demonstrated. When and a pressure welding is carried out to a mirror plane drum, a coating layer is crushed, and the coating layer of uniform and sufficient amount of coating is not obtained, but printing concentration and gloss tend to become inadequate. Furthermore, a coating layer carries out transition adhesion at a mirror plane drum, gloss falls or a possibility of a mirror plane drum becoming dirty and becoming an operation top problem arises.

[0021] Coating of the coating liquid for cast coating layers is carried out on a base material or an under coat, and to the mirror plane drum heated while the under coat was in the damp or wet condition, it dries, and a pressure welding and when finishing, the approach of promoting immobilization of the coating liquid for cast coating layers can also be taken in order to obtain the coating layer of uniform and sufficient amount of coating. Blend a gelling agent which promotes immobilization of the coating liquid for cast coating layers for example, in (1) base material or an under coat as this approach. (2) Do coating and sinking in in of a gelling agent which promotes immobilization of the coating liquid for cast coating layers on a base material or an under coat. (3) After carrying out coating of the coating liquid for cast coating layers, blending a gelling agent with which immobilization is promoted in the process in which coating liquid dries a gelling agent which promotes immobilization of the coating liquid for cast coating layers on a front face in coating and the coating liquid for (4) cast coating layers to infiltrate is mentioned. As such a gelling agent, those salts, such as a way acid, formic acid, etc.

which are the cross linking agent of the adhesives in the coating liquid for cast coating layers, and an aldehyde compound, an epoxy compound, etc. are mentioned. Coating of the coating constituent for cast coating layers and the same constituent is carried out on a base material or an under coat, and desiccation or after half-drying, coating of the coating constituent for cast coating layers can be further carried out on this coating layer, and it can also dry by cast drum lifting.

[0022] In order to adjust a whiteness degree, viscosity, a fluidity, etc. in the coating constituent for cast coating layers, various assistants, such as the pigment currently used for the general coated paper for printing and general inkjet printing paper, a defoaming agent, a coloring agent, a fluorescent brightener, an antistatic agent, antiseptics and a dispersant, and a thickener, are added suitably. Moreover, a release agent can be added in order to give the mold-release characteristic from a cast drum etc. the case where coating of the coating liquid for cast coating layers mentioned above is carried out on an under coat -- various kinds, such as a blade coating machine, an air knife coater, a roll coater, a brush coating machine, a CHAMPU REXX coating machine, a bar coating machine, and a gravure coating machine, -- well-known coating equipment can be used. the amount of coating of a cast coating layer -- desiccation solid content -- 1 - 30 g/m² -- desirable -- 1.5 - 20 g/m² -- more -- desirable -- 3 - 15 g/m² it is . Here, it is 1 g/m². In the following, neither printing concentration nor gloss may fully come out, and it is 30 g/m². It exceeds, and when many, effectiveness is saturated and a possibility that a burden may be placed on desiccation and operability may fall has it. After preparing a cast coating layer according to cast finishing, a supercalender etc. can also perform data smoothing further.

[0023] The reason the inkjet printing paper excellent in gloss and especially ink jet record fitness are obtained by this invention is considered as the following. First, the reason which raises a quality of printed character is explained. If the secondary particle diameter of the silica very fine particle used for a cast coating layer is made small, in the cast coating layer whose transparency increased more, coloring of the ink in which the transparency of a cast coating layer was held at increase and a gloss layer will become is hard to be barred, and will be considered as a result that image grace (printing concentration) improves. Furthermore, in the mode which a cationic compound contains in a cast coating layer, since a cast coating layer is alternatively fixed to the color component in ink, it is more discovered and the above-mentioned effectiveness is desirable. Moreover, although existence of an under coat serves to absorb ink promptly, in the mode which a cationic compound does not contain substantially in an under coat, a cationic compound contains in a gloss layer, and probably because an under coat absorbs the solvent component in ink promptly, it is excellent [a cast coating layer is alternatively established in the color component in ink and / under coat] in printing concentration and absorptivity. Next, the reason whose glossiness improves is explained. In order to prepare a cast coating layer with a cast method, the smooth nature of a cast drum is imprinted, and since the secondary particle diameter of the silica very fine particle which is used for a cast coating layer in addition to becoming the thing excellent in gloss is small enough, it becomes what has the gloss of a cast coating layer front face there is little scattered reflection of light and still higher.

[0024]

[Example] Although an example is given to below and this invention is explained more concretely, of course, it is not limited to these. Moreover, the section in an example and

especially % show weight section and weight %, respectively, unless it refuses.

The paper manufacture ingredient which consists of the "production of paper base" wood pulp (LBKP; freeness 500mlCSF) 100 section, the baking kaolin (trade name: ANSI REXX, Engel HADO mineral company make) 10 section, the commercial sizing compound 0.05 section, the sulfuric-acid band 1.5 section, the humid paper durability agent 0.5 sections, and the starch 0.75 section is used, and it is basis-weight 120 g/m² with a Fortlinear paper machine. The paper base was manufactured. The Stockigt sizing degree of this paper base was 10 seconds. In the example of this invention, and the example of a comparison, this paper base was used altogether.

"Preparation of a silica very fine particle"

Actuation of grinding was repeated using the pressure type homogenizer (SMT company make, trade name:extra-high voltage type homogenizer GM-1) using the water dispersion of the [silica very fine particle A] composition amorphous silica (the Tokuyama make, a trade name: fine seal X-45 or secondary particle diameter of 4.5 micrometers, primary particle diameter of 15nm) (500kg/cm² of pressurization). The secondary [an average of] particle diameter of the silica in after [processing] dispersion liquid was 50nm, and solid content concentration was 12% (the diameter of a primary particle with 15nm).

Actuation of grinding was repeated using the pressure type homogenizer (SMT company make, trade name:extra-high voltage type homogenizer GM-1) using the water dispersion of the [silica very fine particle B] composition amorphous silica (Japanese silica industrial company make, trade name:Nipsil HD-2 or secondary particle diameter of 3 micrometers, primary particle diameter of 11nm) (500kg/cm² of pressurization). The secondary [an average of] particle diameter of the silica in the dispersion liquid after processing was 200nm, and solid content concentration was 12% (primary particle diameter with 11nm).

Actuation of grinding was repeated using the pressure type homogenizer (SMT company make, trade name:extra-high voltage type homogenizer GM-1) using the water dispersion of the [silica very fine particle C] composition amorphous silica (Japanese silica industrial company make, trade name:Nipsil LP, secondary particle diameter of 9 micrometers, primary particle diameter of 16nm) (500kg/cm² of pressurization). The secondary [an average of] particle diameter of the silica in the dispersion liquid after processing was 500nm, and solid content concentration was 12% (primary particle diameter with 16nm).

In case the above-mentioned silica very fine particles A, B, or C and the above-mentioned cationic compound are mixed in the example below "mixing of a silica very fine particle and a cationic compound", and the example of a comparison, although the condensation after mixed distribution takes place, both Furthermore, it grinds using a pressure type homogenizer (SMT company make, trade name:extra-high voltage type homogenizer GM-1) (500kg/cm² of pressurization). It processed until the secondary [an average of] particle diameter of the silica in dispersion liquid became the same as the secondary [an average of] particle diameter of the silica very fine particle of a basis, respectively (even if the diameter of a primary particle carries out grinding distribution, it does not change).

[0025] an example 1 paper-base top -- the coating liquid for the following under coats -- dry weight -- 12g/m² it becomes -- as -- an air knife coater -- coating -- it dried. Next, after having carried out coating by the air knife coater on the above-mentioned under

coat, drying for 20 seconds with cold blast and making the coating liquid for the following cast coating layers into half-dryness (150% of moisture regain to the amount of coating layer bone-dry solid content), the pressure welding was carried out to the mirror plane drum whose skin temperature is 100 degrees C, after desiccation, it was made to release from mold and the gloss type ink jet record form was obtained. the amount of coating of the cast coating layer at this time -- solid content weight -- it is -- 6g/m² it was

[Coating liquid for under coats] (17% of solid content concentration and the section show the solid content weight section.)

Synthetic amorphous silica (fine seal X-45; the Tokuyama make and the second [an average of] particle diameter of 4.5 micrometers) 15nm 80 sections of diameters of a primary particle, and a zeolite (TOYOBIRUDA; -- the Toso make --) Mean-particle-diameter the 20 sections of 1.5 micrometers, the silyl denaturation polyvinyl alcohol (R1130; Kuraray make) 20 section, The complex emulsion (for copolymer and colloidal silica, particle diameter of 40:60 and emulsion is 80nm at weight ratio) 40 section of the styrene-2 methyl hexyl acrylate copolymer of 75 degrees C of glass transition points, and colloidal silica with a particle diameter of 30nm, The fluorescent dye (WhitexBPSH; Sumitomo Chemical make) 2 section.

[0026] [Coating liquid for cast coating layers] (12% of solid content concentration and the section show the solid content weight section)

The silica very fine particle A80 section, the colloidal silica (cationic colloidal silica; Nissan Chemical Industries make and trade name; Snow tex AK, mean particle diameter of 15nm) 20 section, the diaryl dimethylammonium chloride-acrylamide copolymer (cationic compound: Nitto Boseki Co., Ltd. make, trade name-AS-J-81) 10 section, the cationic aqueous urethane resin (F-8564D; Dai-Ichi Kogyo Seiyaku make, T_g=73 degree C) 25 section, the octadecanamide 5 section [0027] In the coating liquid for example 2 cast coating layers, the gloss type ink jet record form was obtained like the example 1 except having made the silica very fine particle A into the 50 sections and the colloidal silica 50 section.

[0028] In the coating liquid for example 3 cast coating layers, the gloss type ink jet record form was obtained like the example 1 except having made the silica very fine particle A into the five sections and the colloidal silica 95 section.

[0029] In the coating liquid for example 4 cast coating layers, the gloss type ink jet record form was obtained like the example 1 except having made the silica very fine particle A into the 98 sections and the colloidal silica 2 section.

[0030] In the coating liquid for example 5 cast coating layers, the gloss type ink jet record form was obtained like the example 1 except having made the silica very fine particle A into the 45 sections and the colloidal silica 55 section.

[0031] The gloss type ink jet record form was obtained like the example 1 except having transposed example 6 colloidal silica to the Snow tex 30 (the Nissan Chemical Industries make, mean particle diameter of 15nm) which is anionic colloidal silica.

[0032] The gloss type ink jet record form was obtained like the example 1 except having transposed example 7 colloidal silica to the anionic Snow tex OL (the Nissan Chemical Industries make, mean particle diameter of 45nm).

[0033] The gloss type ink jet record form was obtained like the example 1 except having transposed example 8 colloidal silica to the Snow tex ZL (the Nissan Chemical Industries

make, mean particle diameter of 85nm) which is anionic colloidal silica.

[0034] In the coating liquid for cast coating layers used in the example 9 example 1, the gloss type ink jet record form was obtained like the example 1 except having changed the silica very fine particle into B from A.

[0035] The gloss type ink jet record form was obtained like the example 1 except having used the coating liquid for gloss layers of the example of comparison 1 following.

[0036] [Coating liquid for cast coating layers] (12% of solid content concentration and the section show the solid content weight section)

The silica very fine particle A100 section, the diaryl dimethylammonium chloride-acrylamide copolymer (cationic compound: Nitto Boseki Co., Ltd. make, trade name-AS-J-81) 10 section, the cationic aqueous urethane resin (F-8564D; Dai-Ichi Kogyo Seiyaku make, Tg=73 degree C) 25 section, the octadecanamide 5 section [0037] In the coating liquid for gloss layers used in the example of comparison 2 example 1, the gloss type ink jet record form was obtained like the example 1 except having changed the silica very fine particle into C from A.

[0038] The gloss type ink jet record form was obtained like the example 1 except having transposed example of comparison 3 colloidal silica to MP-3040 (the Nissan Chemical Industries make, mean particle diameter of 300nm) which is anionic colloidal silica.

[0039] What was prepared to the under coat in example of comparison 4 example 1 was used.

[0040] Example of comparison 5 paper base was used as it was.

In the coating liquid for example of comparison 6 cast coating layers, the ink jet record form was obtained like the example 1 except having changed the silica very fine particle A into synthetic amorphous silica (fine seal X-45; the Tokuyama make, second [an average of] particle diameter of 4.5 micrometers, 15nm of diameters of a primary particle).

[0041] Thus, the ink jet record fitness of the obtained ink jet record form and blank paper gloss were collectively shown in Table 1. In addition, the approach like the following estimated the above-mentioned evaluation.

It printed using [ink jet record fitness] ink jet printer BJC420J (Canon, Inc. make).

(Homogeneity of the solid printing section) Viewing estimated the printing nonuniformity (shade nonuniformity) of the solid printing section of 2 color mixing of cyanogen ink and Magenta ink.

O : it does not see but printing nonuniformity is good level.

**: Level from which there is printing nonuniformity a little and it poses a problem a little practically.

x: Level from which printing nonuniformity is remarkable and poses a practically serious problem.

(Printing NIJIMI) The solid printing section of black, cyanogen, a Magenta, and each color ink of yellow was printed so that the boundary section might touch mutually, and viewing estimated NIJIMI in a boundary.

O : it does not see but NIJIMI is good level.

O - : level from which level **:NIJIMI which does not pose a problem practically is a little conspicuous, and poses a problem a little practically although there is NIJIMI a little.

x: Level from which NIJIMI is remarkable and poses a practically serious problem.

(Drying [of ink]) It evaluated drying [of ink] per solid printing section of 2 color mixing of cyanogen ink and Magenta ink.

O : even if a finger describes immediately after printing, don't become dirty at all.

** : Level which is satisfactory practically although it will become dirty a little, if a finger describes immediately after printing.

x : It will become dirty if a finger describes immediately after printing.

(Printing concentration after ink jet record) The printing concentration of a black solid printing part is measured by Macbeth RD-914.

[0042] [Glossiness] According to JIS-P8142, 75-degree gloss of the blank paper section was measured.

[a visual appearance] -- a feeling of gloss, and a smooth feeling -- viewing -- evaluation

O : -- it excels extremely.

O : excel.

** : It is a little inferior.

x : It is inferior.

[0043] [Comprehensive evaluation]

printing grace and gloss -- synthetic -- evaluation 5: -- it excels extremely.

4: Excel.

3: Usually.

2: It is a little inferior.

1: It is inferior.

[0044]

[Table 1]

[0045]

[Effect of the Invention] This invention was the ink jet record form which was excellent in ink drying, an appearance, and glossiness, and was excellent in ink jet record fitness, such as printing concentration, record image quality, and solid homogeneity.